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CLAIMS

1. A radar system for detection of one or more objects, said system comprising:

a radar wave transmitter for simultaneously transmitting a CW radar signal and a FM-CW or MF radar signal, and

a first radar wave receiver for receiving CW and FM-CW or MF radar signals reflected from one or more objects present in a detection range of the radar system.

2. A radar system according to claim 1, further comprising:

a first CW mixer for mixing CW transmission signals and reflected CW signals received by the first receiver, and

a first FM-CW or MF mixer for mixing FM-CW or MF transmission signals and corresponding reflected FM-CW or MF signals received by the first receiver.

3. A radar system according to claim 2, wherein
the radar wave transmitter is adapted for simultaneously transmitting a CW radar signal and a MF radar signal,
the first radar wave receiver is adapted for receiving CW and MF radar signals reflected from an object present in a detection range of the radar system,
the first CW mixer is a mixer for mixing CW transmission signals and reflected CW signals received by the first receiver to produce one or more first CW beat signals, each first CW beat signal relating to the velocity of an object, and
the first FM-CW or MF mixer is a first MF mixer for mixing MF transmission signals and reflected MF signals received by the first receiver to produce one or more first MF beat signals, each first MF beat signal relating to the distance to and the velocity of an object.

4. A radar system for detection of one or more objects, said system comprising:

a radar wave transmitter for simultaneously transmitting a CW radar signal and a MF radar signal,

a first radar wave receiver for receiving CW and MF radar signals reflected from one or more objects present in a detection range of the radar system,

5   a first CW mixer for mixing CW transmission signals and reflected CW signals received by the first receiver to produce one or more first CW beat signals, each first CW beat signal relating to the velocity of an object, and

a first MF mixer for mixing MF transmission signals and reflected MF signals received by the first receiver to produce one or more first MF beat signals, each first
10   MF beat signal relating to the distance to and the velocity of an object.

5. A radar system according to claim 2, wherein
the radar wave transmitter is adapted for simultaneously transmitting a CW radar
15   signal and a FM-CW radar signal,
the first radar wave receiver is adapted for receiving CW and FM-CW radar signals reflected from one ore more objects present in a detection range of the radar system,
the first CW mixer is a mixer for mixing CW transmission signals and reflected CW
20   signals received by the first receiver to produce one or more first CW beat signals, each first CW beat signal relating to the velocity of an object, and
the first FM-CW or MF mixer is a first FM-CW mixer for mixing FM-CW transmission signals and reflected FM-CW signals received by the first receiver to produce one or more first FM-CW beat signals relating to the distance to and the velocity of an ob-
25   ject.

6. A radar system for detection of one or more objects, said system comprising:

a radar wave transmitter for simultaneously transmitting a CW radar signal and a
30   FM-CW radar signal,

a first radar wave receiver for receiving CW and FM-CW radar signals reflected from one or more objects present in a detection range of the radar system,

a first CW mixer for mixing CW transmission signals and reflected CW signals re-
ceived by the first receiver to produce one or more first CW beat signals, each first
CW beat signal relating to the velocity of an object, and

5   a first FM-CW mixer for mixing FM-CW transmission signals and reflected FM-CW
signals received by the first receiver to produce one or more first FM-CW beat sig-
nals, each first FM-CW beat signal relating to the distance to and the velocity of an
object.

10   7. A radar system according to claim 1, 2, 5 or 6, wherein
the radar wave transmitter is adapted for simultaneously transmitting a CW radar
signal and a FM-CW radar signal, wherein the FM-CW radar signal is a ramp modu-
lated signal.

15   8. A radar system according to claim 7, wherein the ramp modulated signal has an
up-ramp waveform with an increase in frequency during the up-ramp period or a
down-ramp waveform with a decrease in frequency during the down ramp period.

9. A radar system according to claim 1, 2, 5 or 6, wherein
20   the radar wave transmitter is adapted for simultaneously transmitting a CW radar
signal and a FM-CW radar signal, wherein the FM-CW radar signal has a triangular
shaped waveform with up-ramp periods having an increase in frequency and down-
ramp periods having a decrease in frequency.

25   10. A radar system according to any one of the claims 1-9, further comprising a least
a second radar wave receiver for receiving reflected CW and FM-CW or MF radar
signals.

11. A radar system according to claim 10, wherein the first and second receivers are
30   arranged in the same plane.

12. A radar system according to claim 10 or 11, wherein at least the first and the
second radar wave receivers are arranged along a first receiver direction.

13. A radar system according to any one of the claims 10-12, further comprising at least a third radar wave receiver for receiving reflected CW and FM-CW or MF radar signals.

5   14. A radar system according to claim 13, wherein the first, second and third receivers are arranged in the same plane.

15. A radar system according to claim 13 or 14, further comprising at least a fourth radar wave receiver for receiving reflected CW and FM-CW or MF radar signals.

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16. A radar system according to claim 15, wherein the first, second, third and fourth receivers are arranged in the same plane.

17. A radar system according to any one of the claims 10-16, wherein at least two

15   receivers are arranged along the first receiver direction and at least two receivers are arranged along a second receiver direction, said first receiver direction being different to the second receiver direction.

18. A radar system according to claim 17, wherein the first and second receiver di-

20   rections are substantially perpendicular to each other.

19. A radar system according to any one of the claims 10-18, further comprising:

a second CW mixer for mixing CW transmission signals and reflected CW signals

25   received by the second receiver to produce one or more second CW beat signals, each second CW beat signal relating to the velocity of an object, and

a second FM-CW mixer for mixing FM-CW transmission signals and reflected FM-CW signals received by the second receiver to produce one or more second FM-CW

30   beat signals, each second FM-CW beat signal relating to the distance to and the velocity of an object.

20. A radar system according to any one of the claims 13-19, further comprising:

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a third CW mixer for mixing CW transmission signals and reflected CW signals received by the third receiver to produce one or more third CW beat signals, each third CW beat signal relating to the velocity of an object, and

5   a third FM-CW mixer for mixing FM-CW transmission signals and reflected FM-CW signals received by the third receiver to produce one or more third FM-CW beat signals, each third FM-CW beat signal relating to the distance to and the velocity of an object.

10   21. A radar system according to any one of the claims 15-20, further comprising:

a fourth CW mixer for mixing CW transmission signals and reflected CW signals received by the fourth receiver to produce one or more fourth CW beat signals, each fourth CW beat signal relating to the velocity of an object, and

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a fourth FM-CW mixer for mixing FM-CW transmission signals and reflected FM-CW signals received by the fourth receiver to produce one or more fourth FM-CW beat signals, each fourth FM-CW beat signal relating to the distance to and the velocity of an object.

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22. A radar system according to any one of the claims 3-21, further comprising means for determining an object velocity or an relative object velocity of one or more objects based on at least part of the produced CW beat signals.

25   23. A radar system according to any one of the claims 3-22, wherein for each CW mixer there is corresponding transforming means for taking the Fourier transform of the beat signal(s) from said CW mixer.

24. A radar system according to claim 23, further comprising means for summing

30   the Fourier transformed outputs corresponding to each of said CW mixer and for determining a number of CW peak frequencies from the summed Fourier transformed CW signals.

25. A radar system according to any one of the claims 5-24, wherein for each FM-CW mixer there is corresponding transforming means for taking the Fourier transform of the beat signal(s) from said FM-CW mixer.

26. A radar system according to claim 25, further comprising means for summing the Fourier transformed outputs corresponding to each of said FM-CW mixer and for determining a number of FM-CW peak frequencies from the summed Fourier transformed FM-CW signals.

27. A radar system according to any one of the claims 24-26, further comprising means for determining a CW object velocity based on a selected CW peak frequency, said CW object velocity corresponding to the velocity or the relative velocity of an object providing a Doppler frequency corresponding to the selected CW peak frequency.

28. A radar system according to claims 9 and 26 and 27, wherein the radar wave transmitter is adapted for transmitting a FM-CW radar signal having a triangular waveform with the frequency being increased at a given first rate and decreased at said first rate, and wherein the radar system comprises:

means for selecting from the determined FM-CW peak frequencies a pair of FM-CW peak frequencies corresponding to consecutive up- and down ramps of the transmitted FM-CW signal,

means for determining a FM-CW object velocity based on the selected pair of FM-CW peak frequencies,

means for comparing the determined FM-CW object velocity with one or more determined CW object velocities to thereby obtain a CW peak frequency corresponding to the selected pair of FM-CW peak frequencies, and

means for determining an object distance from the selected pair of FM-CW peak frequencies or from the corresponding CW peak frequency and at least one of the selected pair of FM-CW peak frequencies.

29. A radar system according to any one of the claims 10-28, further comprising means for detecting phase differences between corresponding reflected CW or FM-CW radar signals received by at least two different radar wave receivers.

30. A radar system according to any one of the claims 12-29, further comprising: one or more phase detectors for detecting, based at least partly on corresponding radar signals received by the receivers along the first receiver direction, one or more time or phase differences relating to a first object angular direction.

31. A radar system according to any one of the claims 17-30, further comprising: one or more phase detectors for detecting, based at least partly on corresponding radar signals received by the receivers along the second receiver direction, one or more time or phase differences relating to a second object angular direction.

32. A radar system according to claim 23 or 25 and claim 30 or 31, wherein a phase detector is adapted for determining a phase difference based on at least two Fourier transformed outputs representing received radar signals corresponding to at least two receivers arranged along the same receiver direction, said received radar signals corresponding to the same transmitted radar signal.

33. A radar system according to any one of the claims 10-32, wherein at least two receivers are arranged horizontally besides each other, whereby a detected time or phase difference between corresponding radar signals received by the two horizontally arranged receivers relates to an azimuth phase difference.

34. A radar system according to any one of the claims 10-33, wherein at least two receivers are arranged vertically above each other, whereby a detected time or phase difference between corresponding radar signals received by the two vertically arranged receivers relates to an elevation phase difference.

35. A radar system according to claim 33 or 34, wherein the first and second receivers are arranged horizontally besides each other, the third and fourth receivers are arranged horizontally besides each other, with the third and fourth receivers being arranged vertically below the first and second receivers, respectively.

36. A radar system according to any one of the claims 12-28 and any one of the claims 29-35, wherein at least two receivers are arranged along the first receiver direction, and wherein the phase detecting means are adapted to determine a first phase difference between corresponding reflected CW or FM-CW radar signals re-

ceived by said at least two radar wave receivers arranged along the first receiver direction, said first phase difference relating to a first object angular direction.

37. A radar system according to claim 36, wherein the phase detecting means are adapted to determine the first phase difference from at least two Fourier transformed outputs representing CW or FM-CW signals corresponding to the at least two receivers arranged along the first receiver direction.

38. A radar system according to any one of the claims 23-28 and any one of the claims 29-37, wherein two receivers are arranged horizontally besides each other, and wherein the phase detecting means are adapted to determine an azimuth phase difference between corresponding reflected CW or FM-CW radar signals received by said two horizontally arranged radar wave receivers.

39. A radar system according to claim 38, wherein the phase detecting means are adapted to determine an azimuth phase difference between two Fourier transformed outputs representing CW or FM-CW signals corresponding to the two horizontally aligned receivers.

40. A radar system according to any one of the claims 17-28 and any one of the claims 29-39, wherein at least two receivers are arranged along the second receiver direction, and wherein the phase detecting means are adapted to determine a second phase difference between corresponding reflected CW or FM-CW radar signals received by said at least two radar wave receivers arranged along the second receiver direction, said second phase difference relating to a second object angular direction.

41. A radar system according to claim 40, wherein the phase detecting means are adapted to determine the second phase difference from at least two Fourier transformed outputs representing CW or FM-CW signals corresponding to the at least two receivers arranged along the second receiver direction.

42. A radar system according to any one of the claims 23-28 and any one of the claims 29-41, wherein two receivers are arranged vertically above each other, and wherein the phase detecting means are adapted to determine an elevation phase

difference between corresponding reflected CW or FM-CW radar signals received by said two vertically arranged radar wave receivers.

43. A radar system according to claim 42, wherein the phase detecting means are adapted to determine an elevation phase difference between two Fourier transformed outputs representing CW or FM-CW signals corresponding to the two vertically aligned receivers.

44. A radar system according to any one of the claims 29-43 and any one of the claims 26-28, wherein the phase detecting means are adapted to determine a phase difference between two Fourier transformed outputs corresponding to a selected CW peak frequency, and to determine a phase difference between two Fourier transformed outputs corresponding to a selected FM-CW peak frequency.

45. A radar system according to claim 35 and any one of the claims 38-44, wherein the phase detecting means are adapted to determine an azimuth phase difference between the sum of the two Fourier transformed outputs corresponding to the first and third receivers and the sum of the two Fourier transformed outputs corresponding to the second and fourth receivers.

46. A radar system according to claim 35 and any one of the claims 38-45, wherein the phase detecting means are adapted to determine an elevation phase difference between the sum of the two Fourier transformed outputs corresponding to the first and second receivers and the sum of the two Fourier transformed outputs corresponding to the third and fourth receivers.

47. A radar system according to any one of the claims 40-46, wherein the phase detecting means are adapted to determine first and second phase differences for Fourier transformed outputs corresponding to a selected CW peak frequency, and for Fourier transformed outputs corresponding to a selected FM-CW peak frequency.

48. A radar system according to any one of the claims 43-47, wherein the phase detecting means are adapted to determine azimuth and elevation phase differences for Fourier transformed outputs corresponding to a selected CW peak frequency,

and for Fourier transformed outputs corresponding to a selected FM-CW peak frequency.

49. A radar system according to claim 47 or 48, further comprising means for establishing and maintaining one or more CW track records corresponding to one or more objects, each track record comprising a number of detected CW peak frequencies as a function of time and further holding information of first and second angular directions as a function of time determined from measurements of corresponding first and second phase differences, or further holding information of azimuth and elevation angles as a function of time determined from corresponding azimuth and elevation phase measurements.

50. A radar system according to claim 49, further comprising means for, based on a selected track record holding CW peak frequency information and information of first and second angular directions as a function of time, predicting for an object corresponding to said selected track record expected CW peak frequencies and first and second angular information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

51. A radar system according to claim 49, further comprising means for, based on a selected track record holding CW peak frequency information and azimuth and elevation angle information as a function of time, predicting for an object corresponding to said selected track record expected CW peak frequencies and azimuth and elevation angle information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

52. A radar system according to any one of the claims 47-51, further comprising means for establishing and maintaining one or more FM-CW track records corresponding to one or more objects, each track record comprising a number of detected FM-CW peak frequencies as a function of time and further holding information of first and second angular directions as a function of time determined from measurements of corresponding first and second phase differences, or further holding information of azimuth and elevation angles as a function of time determined from corresponding azimuth and elevation phase measurements.

53. A radar system according to claim 52, further comprising means for, based on a selected track record holding FM-CW peak frequency information and information of first and second angular directions as a function of time, predicting for an object corresponding to said selected track record expected FM-CW peak frequencies and

5   first and second angular information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

54. A radar system according to claim 52, further comprising means for, based on a selected track record holding FM-CW peak frequency information and azimuth and

10   elevation angle information as a function of time, predicting for an object corresponding to said selected track record expected FM-CW peak frequencies and azimuth and elevation angle information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

15   55. A radar system according to claim 49 and 52, further comprising means for selecting from the CW track records and the FM-CW track records one or more pairs of CW and FM-CW peak frequencies having corresponding first and second angular directions or corresponding azimuth and elevation angles, and for determining from an obtained pair of CW and FM-CW peak frequencies an object velocity and a cor-

20   responding object distance.

56. A radar system according to claim 28 or 55, further comprising means for establishing and maintaining one or more track records holding combined CW and FM-CW peak frequency information as a function of time for one or more objects having

25   a velocity and distance determined from a pair of previously measured CW and/or FM-CW peak frequencies having corresponding velocities.

57. A radar system according to claim 56, further comprising means for, based on a selected track record holding combined CW and FM-CW peak frequency information

30   as a function of time, predicting for an object corresponding to said selected track record expected CW and FM-CW peak frequencies at a required time posterior to the time of the last stored peak frequency information of said selected track record.

58. A radar system according to claim 55, further comprising means for establishing

35   and maintaining one or more track records holding combined CW and FM-CW peak

frequency information and information of first and second angular directions as a function of time for one or more objects having a velocity and distance determined from a pair of previously measured CW and FM-CW peak frequencies having corresponding first and second angular directions.

59. A radar system according to claim 58, further comprising means for, based on a selected track record holding combined CW and FM-CW peak frequency information and information of first and second angular directions as a function of time, predicting for an object corresponding to said selected track record expected CW and FM-CW peak frequencies and information of first and second angular directions at a required time posterior to the time of the last stored peak frequency information of said selected track record.

60. A radar system according to claim 55, further comprising means for establishing and maintaining one or more track records holding combined CW and FM-CW peak frequency information and azimuth and elevation angle information as a function of time for one or more objects having a velocity and distance determined from a pair of previously measured CW and FM-CW peak frequencies having corresponding azimuth and elevation angles.

61 . A radar system according to claim 60, further comprising means for, based on a selected track record holding combined CW and FM-CW peak frequency information and azimuth and elevation angle information as a function of time, predicting for an object corresponding to said selected track record expected CW and FM-CW peak frequencies and azimuth and elevation angle information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

62. A method of radar detection of one or more objects, said method comprising:

simultaneously transmitting a CW radar signal and a FM-CW or MF radar signal, and

receiving, via a first radar receiver, reflected CW and FM-CW or MF radar signals reflected from one or more object present in a detection range of the radar system.

63. A method according to claim 62, further comprising:

mixing, via a first CW mixer, CW transmission signals and reflected CW signals re-
5   ceived by the first receiver, and

mixing, via a first FM-CW or MF mixer, FM-CW or MF transmission signals and cor-
responding reflected FM-CW or MF signals received by the first receiver.

10   64. A method according to claim 63, wherein
the CW radar signal is transmitted simultaneously with a MF radar signal,
the receiving step comprises receiving CW and MF radar signals reflected from one
or more objects present in a detection range of the radar system,
the CW transmission signals and reflected CW signals received by the first receiver
15   are mixed, via the first CW mixer, to produce one or more first CW beat signals,
each first CW beat signal relating to the velocity of an object, and
the MF transmission signals and reflected the MF signals received by the first re-
ceiver are mixed, via a first MF mixer, to produce one or more first MF beat signals,
each first MF beat signal relating to the distance to and the velocity of an object.

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65. A method of radar detection of one or more objects, said method comprising:

simultaneously transmitting a CW radar signal and a MF radar signal,

25   receiving, via a first radar wave receiver, reflected CW and MF radar signals re-
flected from one or more objects present in a radar detection range,

mixing, via a first CW mixer, CW transmission signals and reflected CW signals re-
ceived by the first receiver to produce one or more first CW beat signals, each first
30   CW beat signal relating to the velocity of an object, and

mixing, via a first MF mixer, MF transmission signals and reflected MF signals re-
ceived by the first receiver to produce one or more first MF beat signals, each first
MF beat signal relating to a distance to and the velocity of an object.

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66. A method according to claim 63, wherein

the CW radar signal is transmitted simultaneously with a FM-CW radar signal,

the receiving step comprises receiving CW and FM-CW radar signals reflected from one or more objects present in a radar detection range,

the CW transmission signals and reflected CW signals received by the first receiver are mixed, via the first CW mixer, to produce one or more first CW beat signals, each first CW beat signal relating to the velocity of an object, and

the FM-CW transmission signals and reflected FM-CW signals received by the first receiver are mixed, via a first FM-CW mixer, to produce one or more first FM-CW beat signals, each first FM-CW beat signal relating to the distance to and the velocity of an object.

67. A method of radar detection of one or more objects, said method comprising:

simultaneously transmitting a CW radar signal and a FM-CW radar signal,

receiving, via a first radar receiver, reflected CW and FM-CW radar signals reflected from an object present in a radar detection range,

mixing, via a first CW mixer, CW transmission signals and reflected CW signals to produce one or more first CW beat signals, each first CW beat signal relating to the velocity of an object, and

mixing, via a first FM-CW mixer, FM-CW transmission signals and reflected FM-CW signals to produce one or more first FM-CW beat signals, each first FM-CW beat signal relating to the distance and the velocity of an object.

68. A method according to claim 62, 63, 66 or 67, wherein the transmitted FM-CW radar signal is a ramp modulated signal.

69. A method according to claim 68, wherein the ramp modulated signal has an up-ramp waveform with an increase in frequency during the up-ramp period or a down-ramp waveform with a decrease in frequency during the down ramp period.

70. A method according to claim 62, 63, 66 or 67 wherein

the transmitted FM-CW radar signal has a triangular shaped waveform with up-ramp periods having an increase in frequency and down-ramp periods having a decrease in frequency.

71. A method according to any one of the claims 62-70, further comprising receiving, via a second radar receiver, said reflected CW and FM-CW or MF radar signals.

72. A method according to claim 71, wherein the first and second receivers are arranged in the same plane.

73. A method according to claim 71 or 72, wherein at least the first and second receivers are arranged along a first receiver direction.

74. A method according to any one of the claims 71-73, further comprising receiving, via a third radar wave receiver, said reflected CW and FM-CW or MF radar signals.

75. A method according to claim 74, wherein the first, second and third receivers are arranged in the same plane.

76. A method according to claim 74 or 75, further comprising receiving, via a fourth radar wave receiver, said reflected CW and FM-CW or MF radar signals.

77. A method according to claim 76, wherein the first, second, third and fourth receivers are arranged in the same plane.

78. A method according to any one of the claims 71-77, wherein at least two receivers are arranged along the first receiver direction and at least two receivers are arranged along a second receiver direction, said first receiver direction being different to the second receiver direction.

79. A method according to claim 78, wherein the first and second receiver directions are substantially perpendicular to each other.

80. A method according to any one of the claims 71-79, further comprising:

mixing, via a second CW mixer, CW transmission signals and reflected CW signals received by the second receiver to produce one or more second CW beat signals, each second CW beat signal relating to the velocity of an object, and

5   mixing, via a second FM-CW mixer, FM-CW transmission signals and reflected FM-CW signals received by the second receiver to produce one or more second FM-CW beat signals, each second FM-CW beat signal relating to the distance to and the velocity of an object.

10   81. A method according to any one of the claims 74-80, further comprising:

mixing, via a third CW mixer, CW transmission signals and reflected CW signals received by the third receiver to produce one or more third CW beat signals, each third CW beat signal relating to the velocity of an object, and

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mixing, via a third FM-CW mixer, FM-CW transmission signals and reflected FM-CW signals received by the third receiver to produce one or more third FM-CW beat signals, each third FM-CW beat signal relating to the distance to and the velocity of an object.

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82. A method according to any one of the claims 76-81, further comprising:

mixing, via a fourth CW mixer, CW transmission signals and reflected CW signals received by the fourth receiver to produce one or more fourth CW beat signals, each

25   CW beat signal relating to the velocity of an object, and

a fourth FM-CW mixer for mixing FM-CW transmission signals and reflected FM-CW signals received by the fourth receiver to produce one or more fourth FM-CW beat signals, each fourth FM-CW signal relating to the distance to and the velocity of an

30   object.

83. A method according to any one of the claims 63-82, further comprising: determining an object velocity or a relative object velocity of one or more objects based on at least part of the produced CW beat signals.

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84. A method according to any one of the claims 63-83, further comprising:
taking the Fourier transform of the beat signals from each CW mixer.

85. A method according to claim 84, further comprising:
summing the Fourier transformed outputs corresponding to each of said CW mixer,
and determining a number of CW peak frequencies from the summed Fourier trans-
formed CW signals.

86. A method according to any one of the claims 66-85, further comprising:
taking the Fourier transform of the beat signals from each FM-CW mixer.

87. A method according to claim 86, further comprising:
summing the Fourier transformed outputs corresponding to each of said FM-CW
mixer, and
determining a number of FM-CW peak frequencies from the summed Fourier trans-
formed FM-CW signals.

88. A method according to any one of the claims 85-87, further comprising:
determining a CW object velocity based on a selected CW peak frequency, said CW
object velocity corresponding to the velocity or the relative velocity of an object pro-
viding a Doppler frequency corresponding to the selected CW peak frequency.

89. A method according to claims 87 and 88, wherein the transmitted FM-CW radar
signal has a triangular waveform with the frequency being increased at a given first
rate and decreased at said first rate, said method further comprising:
        selecting from the determined FM-CW peak frequencies a pair of FM-CW
peak frequencies corresponding to consecutive up- and down ramps of the transmit-
ted FM-CW signal,
        determining a FM-CW object velocity based on the selected pair of FM-CW
peak frequencies,
        comparing the determined FM-CW object velocity with one or more deter-
mined CW object velocities to thereby obtain a CW peak frequency corresponding to
the selected pair of FM-CW peak frequencies, and

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determining an object distance from the selected pair of FM-CW peak frequencies or from the corresponding CW peak frequency and at least one of the selected pair of FM-CW peak frequencies.

5   90. A method according to any one of the claims 71-89, further comprising: detecting phase differences between corresponding reflected CW or FM-CW radar signals received by at least two different radar wave receivers.

91. A method according to any one of the claims 73-90, wherein at least two receiv-

10   ers are arranged along the first receiver direction, said method further comprising:

detecting a time or phase difference between corresponding radar signals received by at least two of the receivers arranged along the first receiver direction, said time or phase difference relating to a first angular direction.

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92. A method according to any one of the claims 78-91, wherein at least two receivers are arranged along the second receiver direction, said method further comprising:

20   detecting a time or phase difference between corresponding radar signals received by at least two of the receivers arranged along the second receiver direction, said time or phase difference relating to a second angular direction.

93. A method according to claim 84 or 85 and claim 91 or 92, wherein the detection

25   of a time or phase difference is based on at least two Fourier transformed outputs representing received radar signals corresponding to at least two receivers arranged along the same receiver direction, said received radar signals corresponding to the same transmitted radar signal.

30   94. A method according to any one of the claims 71-93, wherein at least two receivers are arranged horizontally besides each other, said method further comprising:

detecting a time or phase difference between corresponding radar signals received by the two horizontally arranged receivers, said time or phase difference relating to

35   an azimuth phase difference.

95. A method according to any one of the claims 71-94, wherein at least two receivers are arranged vertically above each other, said method further comprising:

detecting a time or phase difference between corresponding radar signals received by the two vertically arranged receivers, said time or phase difference relating to an elevation phase difference.

96. A method according to claim 94 or 95, wherein the first and second receivers are arranged horizontally besides each other, the third and fourth receivers are arranged horizontally besides each other, with the third and fourth receivers being arranged vertically below the first and second receivers, respectively.

97. A method according to any one of the claims 73-96, wherein two receivers are arranged along the first receiver direction, and wherein said detecting of phase differences comprises determining a first phase difference between corresponding reflected CW or FM-CW radar signals received by said at least two radar wave receivers arranged along the first receiver direction, said first phase difference relating to a first object angular direction.

98. A method according to claim 97, wherein said detecting of phase differences comprises determining the first phase difference from at least two Fourier transformed outputs representing CW or FM-CW signals corresponding to at least two of the receivers arranged along the first receiver direction.

99. A method according to any of the claims 84-89 and any of the claims 90-98, wherein two receivers are arranged horizontally besides each other, and wherein said detecting of phase differences comprises determining an azimuth phase difference between corresponding reflected CW or FM-CW radar signals received by said two horizontally arranged radar wave receivers.

100. A method according to claim 99, wherein said detecting of phase differences comprises determining an azimuth phase difference between two Fourier transformed outputs representing CW or FM-CW signals corresponding to the two horizontally aligned receivers.

101. A method according to any one of the claims 78-89 and any one of the claims 90-100, wherein at least two receivers are arranged along the second receiver direction, and wherein said detecting of phase differences comprises determining a second phase difference between corresponding reflected CW or FM-CW radar signals received by said at least two radar wave receivers arranged along the second receiver direction, said second phase difference relating to a second object angular direction.

102. A method according to claim 101, wherein said detecting of phase differences comprises determining the second phase difference from at least two Fourier transformed outputs representing CW or FM-CW signals corresponding to at least two of the receivers along the second direction.

103. A method according to any one of the claims 84-89 and any one of the claims 90-102, wherein two receivers are arranged vertically above each other, and wherein said detecting of phase differences comprises determining an elevation phase difference between corresponding reflected CW or FM-CW radar signals received by said two vertically arranged radar wave receivers.

104. A method according to claim 103, wherein said detecting of phase differences comprises determining an elevation phase difference between two Fourier transformed outputs representing CW or FM-CW signals corresponding to the two vertically aligned receivers.

105. A method according to any one of the claims 87-89 and any one of the claims 90-104, wherein said detecting of phase differences comprises determining a phase difference between two Fourier transformed outputs corresponding to a selected CW peak frequency, and determining a phase difference between two Fourier transformed outputs corresponding to a selected FM-CW peak frequency.

106. A method according to claim 96 and any one of the claims 99-105, wherein said detecting of phase differences comprises determining an azimuth phase difference between the sum of the two Fourier transformed outputs corresponding to the

first and third receivers and the sum of the two Fourier transformed outputs corresponding to the second and fourth receivers.

107. A method according to claim 96 and any one of the claims 99-106, wherein said detecting of phase differences comprises determining an elevation phase difference between the sum of the two Fourier transformed outputs corresponding to the first and second receivers and the sum of the two Fourier transformed outputs corresponding to the third and fourth receivers.

108. A method according to any one of the claims 101-107, wherein said detecting of phase differences comprises determining first and second phase differences for Fourier transformed outputs corresponding to a selected CW peak frequency, and for Fourier transformed outputs corresponding to a selected FM-CW peak frequency.

109. A method according to any one of the claims 104-108, wherein said detecting of phase differences comprises determining azimuth and elevation phase differences for Fourier transformed outputs corresponding to a selected CW peak frequency, and for Fourier transformed outputs corresponding to a selected FM-CW peak frequency.

110. A method according to claim 108 or 109, further comprising:
establishing and maintaining one or more CW track records corresponding to one or more objects, each track record comprising a number of detected CW peak frequencies as a function of time and further holding information of first and second angular directions as a function of time determined from measurements of corresponding first and second phase differences, or further holding information of azimuth and elevation angles as a function of time determined from corresponding azimuth and elevation phase measurements.

111. A method according to claim 110, further comprising, based on a selected track record holding CW peak frequency information and information of first and second angular directions as a function of time, predicting for an object corresponding to said selected track record expected CW peak frequencies and information of first

and second angular directions at a required time posterior to the time of the last stored peak frequency information of said selected track record.

112. A method according to claim 110, further comprising, based on a selected track record holding CW peak frequency information and azimuth and elevation angle information as a function of time, predicting for an object corresponding to said selected track record expected CW peak frequencies and azimuth and elevation angle information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

113. A method according to any one of the claims 108-112, further comprising: establishing and maintaining one or more FM-CW track records corresponding to one or more objects, each track record comprising a number of detected FM-CW peak frequencies as a function of time and further holding information of first and second angular directions as a function of time determined from measurements of corresponding first and second phase differences, or further holding information of azimuth and elevation angles as a function of time determined from corresponding azimuth and elevation phase measurements.

114. A method according to claim 113, further comprising, based on a selected track record holding FM-CW peak frequency information and information of first and second angular directions as a function of time, predicting for an object corresponding to said selected track record expected FM-CW peak frequencies and information of first and second angular directions at a required time posterior to the time of the last stored peak frequency information of said selected track record.

115. A method according to claim 113, further comprising, based on a selected track record holding FM-CW peak frequency information and azimuth and elevation angle information as a function of time, predicting for an object corresponding to said selected track record expected FM-CW peak frequencies and azimuth and elevation angle information at a required time posterior to the time of the last stored peak frequency information of said selected track record.

116. A method according to claim 110 and 113, further comprising:

selecting from the CW track records and the FM-CW track records one or more pairs of CW and FM-CW peak frequencies having corresponding first and second angular directions or corresponding azimuth and elevation angles, and determining from an obtained pair of CW and FM-CW peak frequencies an object velocity and a corresponding object distance.

117. A method according to claim 89 or 116, further comprising: establishing and maintaining one or more track records holding combined CW and FM-CW peak frequency information as a function of time for one or more objects having a velocity and distance determined from a pair of previously measured CW and/or FM-CW peak frequencies having corresponding velocities.

118. A method according to claim 117, further comprising, based on a selected track record holding combined CW and FM-CW peak frequency information as a function of time, predicting for an object corresponding to said selected track record expected CW and FM-CW peak frequencies at a required time posterior to the time of the last stored peak frequency information of said selected track record.

119. A method according to claim 116, further comprising: establishing and maintaining one or more track records holding combined CW and FM-CW peak frequency information and information of first and second angular directions as a function of time for one or more objects having a velocity and distance determined from a pair of previously measured CW and FM-CW peak frequencies having corresponding first and second angular directions.

120. A method according to claim 119, further comprising, based on a selected track record holding combined CW and FM-CW peak frequency information and information of first and second angular directions as a function of time, predicting for an object corresponding to said selected track record expected CW and FM-CW peak frequencies and information of first and second angular directions at a required time posterior to the time of the last stored peak frequency information of said selected track record.

121. A method according to claim 116, further comprising:

establishing and maintaining one or more track records holding combined CW and FM-CW peak frequency information and azimuth and elevation angle information as a function of time for one or more objects having a velocity and distance determined from a pair of previously measured CW and FM-CW peak frequencies having corre-

5   sponding azimuth and elevation angles.

122. A method according to claim 121, further comprising, based on a selected track record holding combined CW and FM-CW peak frequency information and azimuth and elevation angle information as a function of time, predicting for an object corre-

10   sponding to said selected track record expected CW and FM-CW peak frequencies and azimuth and elevation angle information at a required time posterior to the time of the last stored peak frequency information of said selected track record.